surface tension of such solutions increases with greater concentration by a term proportional to the number of equivalent weights of salt in the solution. For fused solid substances he has measured the surface tension by the methods depending on the weight of falling drops, and on the size and form of drops formed on a flat surface. Employing, then, a quantity a^2 which he calls the "specific cohesion" of the substance (defined by $a^2=2$ [surface tension]/ density), he found the remarkable result that ("to a degree of approximation closer than that which holds good for Dulong and Petit's law of atomic heats") all pure substances fall into one or other of six classes the specific cohesions of which are in the ratio of $\frac{1}{2}$ (*e.g.* phosphorus, sulphur, bromides, iodides): 1 (*e.g.* Hg, Pb, chlorides, nitrates, sugars): 2 (*e.g.* water, Ag, carbonates, sulphates): 3 (*e.g.* Zn, Fe): 4 (K): 7 (Na). It may be noted that a^2 measures the capillary attraction of a fluid sphere of unit radius on unit mass at its surface. That this quantity for various fluids is proportional to 1, 2, 3 . . . is in remarkable contrast to the fact that gravitational attraction is independent of the nature of the substances involved.

One of Quincke's most interesting and characteristic researches relates to the motions produced in drops clothed with oil films when an alkali is brought into contact with the oil, forming soap, which locally disturbs the existing surface tensions and causes a movement of the drop. Quincke sees in this the explanation of the movements of protoplasm. To quote his own words, "Ich glaube gezeigt zu haben, dass der Zellinhalt (das Protoplasma und der Zellsaft) jeder Pflanzenzelle von einer lünnen Oelhaut bekleidet ist: dass dünne Oellamellen mit festem und flüssigem Eiweiss die Plasmamasse durchziehen, und dass durch Einwirkung des alkalischen Eiweiss auf das oelsäurehaltige Oel periodisch 'Eiweiss-seife' entsteht, aufgelöst und an der Grenze von Oel und umgebender Flüssigkeit ausgebreitet wird. Diese periodische Ausbreitung der wässrigen Lösung von Eiweiss-seife gab dann die physikalische Erklärung der im Innern der Pflanzenzelle beobachteten Bewegungserscheinungen." Quincke's most recent researches relate chiefly to his favourite problems of molecular physics, but are, for the most part, still unpublished.

Reference has already been made to the Heidelberg "Praktikum," or course of practical physics, for which Quincke has devised many ingenious forms of simple and cheap apparatus, which are yet capable of giving surprisingly good quantitative results. Here one may see an optical bench which, though chiefly made of a half-metre scale and some cork, sealing wax and glass strips, yet enables the student to make all the usual measurements with mirrors and lenses, without dark room, and with an accuracy equal to that obtainable with apparatus many times larger and more expensive. Again, Quincke has invented a form of reflecting galvanometer[1] which costs some fifty shillings in all, but is sufficient for all ordinary electric measurements, not merely for learners, but also for research students. Want of space forbids us to tell of the almost innumerable devices for solving just those problems which confront so many of our science teachers in England at this moment which the Heidelberg laboratory contains. A word may be spared for two seeming trifles which are astonishingly useful. One is the lidless box used as a seat, giving three different heights, according as it is placed on its short, long or open side. A few of these can be combined with a screw clamp or two in endless ways to serve as supports for apparatus, &c. The other is a form of trestle[2] (with the two slant legs at one end replaced by one vertical one), which is very convenient as a support for pendulums and other such apparatus.

[1] This, together with Quincke's invaluable "Cathetometer Microscope," is visible on the table behind the Professor's right arm in the photograph reproduced herewith.

[2] Visible on the right of the photograph.

It is much to be hoped that Prof. Quincke may see his way to publish his laboratory notes in book form, and if he would accompany such a book with directions for carrying out what a witty Heidelberg student described as "Quincke's cork-wax-pfennig system," he would be conferring a boon on many students and more teachers. But we fear it is hardly likely that the claims on his time as teacher and investigator will allow opportunity for this to be done.

EMILIEN JEAN RENOU.

M. RENOU was born at Vendôme, March 8, 1815, and, naturally, went to the Lycée there. He entered the École Polytechnique in 1835 and later the École des Mines, where he studied under Élie de Beaumont. He subsequently visited German universities for two years, especially the lectures of Gauss at Göttingen.

From 1839–42 he was attached to the Scientific Commission of Algeria and published a "Description Géologique de l'Algérie." In 1846 he was directed to collect all the information as to Morocco which he could find, and the result was a valuable work, "Description de l'Empire du Maroc." He made a second visit to Algeria, at his own expense, to verify previous geographical determinations.

In 1850 he resolved to devote himself almost exclusively to meteorology, and he was one of the founding members of the Société Météorologique in 1853. He has published numerous papers in its *Annuaires*. He acted as its secretary for eleven years, not consecutive, and no less than four times was elected to fill the office of president.

In 1868 he was one of the members of a committee, under the presidency of Charles Ste. Claire Deville, for the organisation of the observatory of Montsouris. After the events of 1870–72, this establishment was placed under M. Marié Davy, and M. Renou had to leave.

In 1872 he was officially appointed director of a laboratory for meteorological research, an office which he held until his death. This establishment was first located at Choisy le Roi, but in a few months it was moved to Parc St. Maur, to a locality rented by M. Renou. On the official establishment of the Bureau Central de Météorologie, M. Renou's station was selected as the central station for the climate of Paris, and the instruments were moved to a plot of ground which was assigned to the Bureau, and where they now remain. M. Renou has contributed to the *Annales* of the Bureau three important papers on the climate of Paris.

M. Renou deservedly received many honours, the principal being Legion of Honour, Chevalier (1847), Officier (1884), Officier de l'Académie (1873), and Officier de l'Instruction Publique (1891).

He died on April 6 at Parc St. Maur at the age of eighty-seven; and he has bequeathed his large library to the public library of his native place, Vendôme.

R. H. S.

NOTES.

THE first of the two annual soirees of the Royal Society will be held on May 14. This is the soiree to which gentlemen only are invited.

THE meeting of the Paris Academy of Sciences on April 14 was adjourned as a sign of respect for the late Prof. A. Cornu, whose untimely death was announced by the president in the following words:—"The Academy of Sciences has suffered a great loss. Prof. Cornu died on Friday, carried away rapidly by a disease which no one could foresee would terminate so sorrowfully. Our colleague was relatively young; he entered the École Polytechnique in 1860 and was nominated a mem-

ber of our Academy in 1878, at thirty-seven years of age. Esteemed as a professor at the École Polytechnique, and contributing to the Bureau des Longitudes every year notices written in perfect language, he died while in active scientific work, leaving saddened parents and friends behind him, and universal regret in the scientific world."

LORD KELVIN has met with an enthusiastic reception in New York, and the signs of profound regard which have been shown to him are expressions of a feeling shared by the whole civilised world. On Saturday he attended the ceremony of the installation of Prof. N. B. Butler, the new president of Columbia University, and when he appeared in the procession a student cried, "Hats off to Kelvin," and all the students, men and women, lifted their college caps. In an article upon Lord Kelvin's career, the New York *Sun* says:—"There are few instruments used on land or sea that do not owe something or everything to Lord Kelvin's active brain. His presence does honour to the United States of America. We welcome him heartily." The *Tribune* says:—"It is natural that many Americans, especially those engaged in scientific pursuits, should covet an opportunity of paying their respects to our distinguished visitor." Similar sentiments appear in other journals, all testifying to Lord Kelvin's greatness of mind and character. A booklet by Mr. John Munro, just published by Mr. H. J. Drane in a series of "Bijou Biographies" (No. ix.), contains many interesting anecdotes and incidents connected with Lord Kelvin's remarkable career, and is well worth reading by those unfamiliar with his life and work.

ON Monday a brilliant reception in honour of Lord Kelvin was given at the Columbia University by the American Institute of Electrical Engineers, the National Academy of Sciences, and other leading scientific associations. Mr. Elihu Thomson, president of the Houston-Thomson Electrical Company, Prof. F. B. Crocker, Prof. Butler, president of the Columbia University, and Prof. R. S. Woodward all delivered addresses in honour of the achievements of Lord Kelvin. The New York correspondent of the *Times* reports that when Lord Kelvin rose to reply the whole audience rose and cheered him enthusiastically for several minutes. He thanked the speakers for their kindly reference to himself in connection with the laying of the Atlantic cable, "but," he added, "Americans must never forget, as the world will never forget, the name of that great American, Cyrus Field. Science has advanced greatly during the years along all lines. One of its greatest achievements has been made by Signor Marconi with wireless telegraphy. It is a great achievement to have sent a message inland from several hundred miles out at sea in this way, and it indicates that the time will come when messages will be sped right over the ocean without the use of any intervening wire. But still, submarine telegraphy will continue to serve us well, even with wireless telegraphy established as a commercial success." Lord Kelvin then proceeded to review modern scientific events, and paid a high tribute to the work done by Mr. Edison in the field of electric lighting. Mr. Edison, who was amongst those present, rose and bowed his acknowledgments to Lord Kelvin, the audience cheering him heartily. Lord Kelvin concluded his speech with a reference to the invention which made possible the transmission of power at a high voltage, and the "harnessing of Niagara Falls." He predicted that a power plant would be established at Niagara that would transmit 40,000 volts a distance of 300 miles. When Lord Kelvin resumed his seat the applause was prolonged for several minutes. After that hundreds of the distinguished audience filed past and shook hands with Lord and Lady Kelvin.

AT the Royal Institution on Thursday, May 1, Dr. A. Smith Woodward will deliver the first of three lectures on "Recent Geological Discoveries." The Friday evening discourse on May 2 will be delivered by Mr. A. E. Tutton, on "Experimental Researches on the Constitution of Crystals"; and on May 9 by Prof. J. Norman Collie, his subject being "Exploration and Climbing in the Canadian Rocky Mountains."

THE Easter vacation party at the Port Erin Biological Station has suffered by the absence abroad of Prof. Herdman and Mr. I. C. Thompson, so that it was not possible to arrange any steam dredging expeditions. Nevertheless, much good work has been done on the shore and with the tow-net, and several workers have spent a profitable vacation at the station. These include Dr. Darbishire, Miss Pratt and Miss Drey from Owens College, Messrs. Pearson and Tattersall from University College, Liverpool, and Mr. Laurie from Oxford. Mr. Cole was to have conducted a vacation class, but was unable to cross owing to a family bereavement. The new and greatly improved station is progressing rapidly and will be opened in the summer.

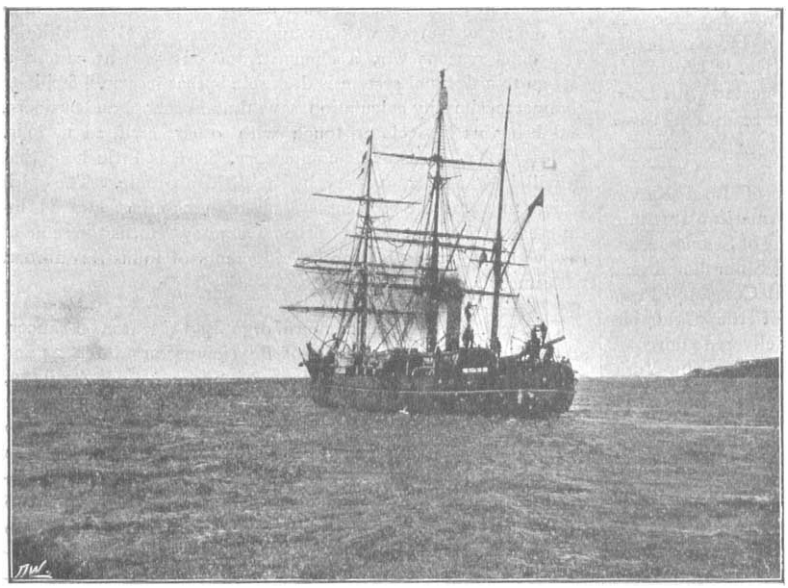
THE Decimal Association has just published a pamphlet containing strong expressions of opinion received from many Members of Parliament in favour of the compulsory adoption of the metric system of weights and measures in Great Britain. The chief reasons why a change from our present cumbrous system to a decimal system is desirable is that it would facilitate commerce, simplify calculation, save time in school and business, and bring us into closer touch with other civilised nations. Unless the system is made compulsory, there is little hope that it will be taught and used by the British people. The spirit which tolerates the present system of reckoning, and is indifferent to the advantages of the decimal system, is the same as that which regards scientific developments of industries abroad with unconcern.

THE text of the draft scheme of organised research on cancer, adopted by the Royal College of Physicians on March 24 and approved by the Royal College of Surgeons on April 10, has now been published. The scheme states that in order to promote investigations into all matters connected with, or bearing on, the causes, prevention and treatment of cancer and malignant disease, steps are to be taken, (1) to provide, extend, equip and maintain laboratories to be devoted exclusively to cancer research; (2) to encourage researches on the subject of cancer within the United Kingdom or in the British dominions beyond the seas; (3) to assist in the development of cancer-research departments in various hospitals and institutions approved by the executive committee; (4) and generally to provide means for systematic investigation in various other directions into the causes, prevention and treatment of cancer. Should the object of the fund be attained by the discovery of the cause and nature of cancer, and of an effective method of treatment, the Royal Colleges, with the consent of the trustees, are to be empowered to utilise the fund either (*a*) for equipping with the necessities for such treatment such hospitals as they may select, or (*b*) for forwarding research into other diseases. The fund is to be administered by a president, vice-presidents, trustees, honorary treasurer, general committee, and executive committee consisting of twelve members, one to be nominated by the Royal Society.

WE have received a reprint of the important paper by Col. G. E. Church, published in the March number of the *Geographical Journal*, on "Interoceanic Communication on the Western Continent." The paper first discusses possibilities of transcontinental railways in South America, but the main subject dealt with is the geographical conditions affecting the different

canal schemes in Central America. The probable traffic of a canal, when constructed, is analysed, and its chance in competition with North American railways estimated.

THE first place in the April number of the *Geographical Journal* is given to a series of three papers on the voyage southward of the *Discovery*, by Dr. H. R. Mill, Mr. George Murray, and Sir Clements Markham. Dr. Mill describes the equipment and routine work on board in meteorology and oceanography, and gives an account of his week's voyage to Madeira. Mr. Murray's paper continues the voyage from Madeira to the Cape, but it is chiefly occupied with an interesting account of a landing expedition on South Trinidad, an oceanic islet the name of which is familiar to readers of the "Cruise of the *Falcon*." Sir Clements Markham describes, from reports which have been sent home, the experiences of the *Discovery* from the time of leaving Cape Town until her final departure from Lyttelton for the Antarctic. During the eastward voyage, the *Discovery* met with exceptionally heavy weather and acquitted herself well, showing that so far as sea-going qualities are concerned her design leaves nothing to be desired, while the constructional defects developed, and partly made good in dock at Lyttelton, are not such as to cause apprehension of any kind. The chief features of the voyage were an excursion to lat. 63° S. in long. 140° E.—with the double object of observing the change of magnetic force along the agonic line, and of giving the ship and her crew a first taste of the ice—and a visit to Macquarie Island, where valuable collections were made. In conclusion, Sir Clements Markham describes the arrangements in progress for sending out a relief ship next June. A Norwegian whaler, the *Morning*, of Tonsberg, has already been purchased, but more funds are urgently needed for her proper equipment and dispatch. The photograph we reproduce from the *Journal* shows the *Discovery's* departure from Lyttelton.



The *Discovery*.

THE United States Weather Bureau has published a discussion of the oss of life in the United States by lightning (*Bulletin* No. 30). The inquiry was begun in 1890, and has therefore extended over eleven years. The number of persons killed during 1900 was 713; of this number 291 were killed in the open, 158 in houses and 57 under trees. In the same year, 973 persons were injured; of these 327 were in houses, 243 in the open and 29 under trees. During the eleven years 1890-1900, the average number of persons killed yearly was 377. The greatest mortality by lightning, considering both unit area and density of population, is in the Ohio Valley and the Middle Atlantic States; but if density of population only be considered, it is in the Upper Missouri Valley and middle Rocky Mountain region. The great majority of storms occur in the summer season, but winter thunderstorms are not infrequent in the Gulf States and occasionally extend eastward along the Atlantic coast to Massachusetts. The *Bulletin* has been prepared by Prof. A. J. Henry, and contains some useful rules to be observed during thunderstorms and on the treatment of persons struck by lightning, even though they may be apparently dead.

MESSRS. A. GALLENKAMP AND CO., the London agents of a well-known firm of opticians of Zürich, have lately introduced to our notice two very handy and effective little instruments for obtaining the dew-point and humidity of the atmosphere without the necessity of calculating the different hygrometric values by means of the usual tables. One of the instruments, Lambrecht's polymeter, so-called from its showing several conditions, is a combination of the thermometer and hair-hygrometer, each provided with two scales, showing temperature in Fahrenheit degrees, elastic force of vapour in millimetres (or weight of vapour in grammes), the relative humidity and "number of degree," or the difference between the dew-point and the temperature of the air. For showing the temperature of the dew-point independently (if desired) a neat little instrument is used, consisting of a drum, to which a thermometer and polished disc are attached; a small quantity of ether is introduced into the drum and brought into contact with the bulb of the thermometer by forcing air into the drum by a very simple contrivance; as soon as the deposition appears on the disc, the temperature of the dew-point is indicated by the thermometer. The chief feature of these instruments is their portability and the facility with which they can be used. Both instruments will be found valuable in connection with questions of health and in certain industries which are affected by moisture; also for the prediction of weather, so far as it depends on the same cause. For the latter purpose a series of rules has been compiled by Dr. A. Troska.

IT was remarked by Laplace that when a liquid is free to rise in a capillary tube there may be several positions of equilibrium if the section is not uniform, and, moreover, that from general dynamical grounds positions of stable and unstable equilibrium follow each other alternately. A fuller investigation of this problem is now given by Signor G. Morera in a note contributed to the *Atti dei Lincei*, xi. 6. The author obtains, from mathematical considerations, a curve the intersections of which with the meridian section of the tube determine the positions of equilibrium. If in ascending the curve passes from the outside to the inside of the tube, the corresponding position of equilibrium is stable; if the contrary is the case, the position is unstable. Of course an exceptional case of what is sometimes called "stable-unstable" equilibrium occurs when Signor Morera's curve touches the meridian section of the tube. In the investigation it is assumed that the interior surface of the tube is a figure

of revolution about a vertical axis. The interest of the paper centres round the determination of the curve from which the positions of equilibrium are found.

THE properties of focal lines have always presented a certain difficulty to the student of geometrical optics. In 1844, Sturm enunciated the theorem that all the rays constituting a small pencil emanating from a luminous point will, after any number of refractions, pass through two focal lines which are at right-angles to each other and to the middle ray of the pencil. Now if the refracting surfaces are surfaces of revolution on a common axis on which the luminous point is situated, the rays after any number of refractions will all intersect this axis, although it is not at right angles to the middle ray. On the contrary, if a screen be placed perpendicular to the middle ray at the point where it meets the axis of revolution, it is easy to see experimentally that the section of the pencil by this screen is approximately a figure of eight, not a straight line as Sturm's theorem would appear to indicate. We are glad to find that this point has been considered by M. H. Bouasse in a note contributed to the *Journal de Physique* for April, and his explanation should help to clear up the obscurities which exist in the conventional treatment of focal lines.

OUR present state of civilisation has of necessity resulted in an annual increase in the amount of capital borrowed by man from the store of energy accumulated by our earth in bygone times, and the diversion of this capital to uses for which the world's annual income of solar energy was formerly deemed adequate. An instance of this tendency is afforded by the experiments of Dr. Selim Lemström, of Helsingfors, on the uses of electricity in stimulating the growth of cereals, vegetables and other plants. A German translation of Dr. Lemström's paper has now been issued by Dr. Otto Pringsheim. The investigation seems to have been suggested in the first instance by an attempt to connect the luxuriant growth of plants in high latitudes with the influence of electric currents associated with the Aurora Borealis. The experiments showed that for plants growing on arable land of medium quality an increase of 45 per cent. in the crops is obtainable; but the better the field is ploughed and cared for the greater will be the increase. On poor soil the effect is trifling. Certain plants, such as peas, cabbages and turnips, only lend themselves to electrical treatment after being watered. It is, however, injurious to most, if not all, plants to submit them to the influence of electricity in hot sunshine. In the introduction, Dr. Pringsheim makes some estimate of the cost of applying the method to agricultural purposes, and arrives at the conclusion that it can be made to pay. A further suggestion is that we have here an explanation of the needle-shaped leaves of coniferous plants which are well adapted to facilitate the passage of electricity, or, in common parlance, "attract electricity."

With the March number, the *Electro-Chemist and Metallurgist* starts its second volume in a new form. It is now issued as a magazine instead of, as hitherto, in the form of a weekly paper, and it must be admitted that its present style is much more suited to its contents and to the fact that it is only published bi-monthly. We wish the journal all success in its endeavour to concentrate attention on a branch of science in which this country is particularly behindhand. The present issue, amongst other interesting articles, contains an account, by Mr. J. R. Crawford, of the Crawford-Voelker electric lamp. This lamp has attracted considerable attention during the past few months, and one or two articles about it have appeared in the technical Press. There is, however, reason to believe that the problem of its commercial manufacture is not yet fully solved, but the experimental results are very promising. The filament, which is run in a vacuum, is composed of carbide of titanium, and is formed by baking in the arc a carbon filament which has been impregnated with an organic compound of titanium. An energy consumption of 2·5 watts per candle is claimed for a 200-volt lamp, which rises after 1000 hours' run to 3·35 watts per candle, the candle power falling in the same time from 16 to 13. This is a very much better result than can be obtained from a carbon lamp, and puts the Crawford-Voelker lamp almost on a level with the Nernst lamp. If the simplicity of the lamp, which requires no preheating, is taken into account, it will be seen that, for small units at any rate, it is likely to prove superior to Nernst's invention. In the interests of the electric light user it is to be hoped that the lamp will soon emerge from the laboratory stage of development.

THE Society of Chemical Industry is gradually extending its borders, and in time, no doubt, will embrace all divisions of the English-speaking races. The New York Section, formed in 1900, is already equal to the London Section of the Society in numbers and importance, and Canadian and Australian Sections are now being formed. The first meeting of the Canadian Section was held on March 6, 1902, in Toronto, and was favoured with a paper by Mr. B. E. F. Rhodin upon the new electrolytic alkali works at Sault Sainte Marie, Ontario. These works were erected in 1900 to operate the Rhodin cell and process for production of alkali and chlorine by electrolysis, and a portion of the plant has been in use since early in 1901. The cell is of the non-diaphragm mercury type, and differs from the better-known Castner cell only in the mechanical means adopted for producing circulation of the sodium amalgam and of the mercury between the anodic and kathodic compartments of the cell. The Rhodin cell cannot be worked in this country owing to litigation, which is still pending, relating to the validity of the Rhodin patents, and the works in Canada represent the first industrial application of the cell and process. The Canadian Electro-Chemical Company are the owners of the works referred to, and a decomposing plant of 120 cells, equivalent to a daily production of 4½ tons caustic soda and 9 tons bleach, has been erected at Sault Sainte Marie. Three turbo-generators, each of 220 k.w., have been installed, and these are driven by water from the St. Mary's River, giving a head of 19 feet at the Power-house. The works are not yet in full operation, as the commercial conditions in Canada are not at present favourable for the sale of the maximum output. It is hoped by the promoters of this Company that at an early date the whole of the Canadian requirements of caustic soda and bleach, will be met by the production of the electrolytic process operated at Sault Sainte Marie.

WE have received from Messrs. Friedlander, of Berlin, a copy of "Naturæ Novitates" for 1901, containing the usual valuable lists of zoological literature.

IN the April number of the *Zoologist* a correspondent directs attention to the probable duration of life in the great white snail. A number of these were turned down at Blaxhall, Suffolk, in 1882 and again in 1884, and as they do not appear to have bred and some are still living, the inference is that the survivors cannot be less than eighteen years of age, while some are probably much older.

AT the auction rooms of Mr. J. C. Stevens on Thursday last there was sold a portion of the collection of birds' eggs formed by the late Mr. Philip Crowley, and containing a fine series of British birds' nests with eggs, and also eggs from another property. The three lots of chief interest were a fine specimen of the Great Auk, 315*l.*; an egg of the Great Auk, 252*l.*; and a very fine specimen of the egg of the Great Æpyornis, slightly cracked, 42*l.*

A LARGE portion of part iii. and the whole of part iv. of the *Archives de Zoologie experimentale* for 1901 are occupied by an elaborate dissertation on the structure and function of the ciliated epithelium of animals—the result of experiments and investigations carried out by Monsieur P. Vignon during the last three years. The main result of the observations, according to the author, is to prove or confirm the existence of "biological coordination." In the same journal M. E. Topsent describes the sponges of the Algerian coast.

WE have received a copy of an interesting paper by Herr W. Voight, from the *Verhandlungen* of the Natural History Association of Prussian Rhineland, &c., describing the extermination of two species of annelids from the freshwaters of the district and their replacement by a third. It appears that until recently *Planaria alpina* inhabited the streams of the Hundsrückgebirge, in the north-western Thuringerwald, and *Polycelis cornuta* those of the Taunus. It is inferred that they have been inhabitants of these regions since the Glacial epoch. At first *F. alpina* alone inhabited both areas; in the Hundsrückgebirge it persisted, but in the Taunus its territory was invaded by *P. cornuta*, which became the dominant form. As the climate grew warmer, a third species, *Planaria gonocephala*, appeared in the lower past of the streams, and has since been gradually spreading upwards until it has replaced both the others over the greater part of their area, the disappearance of *P. alpina* from many streams in the one district and of *P. cornuta* from those of the other being recent events.

IT is but seldom that it falls to the lot of the same individual to reoccupy the presidential chair of a scientific (or any other) society after an interval of twenty-one years, and we have accordingly much pleasure in offering our congratulations to Prof. R. Meldola on his assumption of that position at the recent "coming-of-age" of the Essex Field Club. Indeed, the club is to be congratulated on the "staying powers" of its officials generally, the president remarking that, with a single exception, the whole of the office-bearers during its twenty-one years of existence are still among us. Probably this is absolutely unique. In his presidential address on the occasion referred to, which is fully reported in the April number of the *Essex Naturalist*, Prof. Meldola summarises the scientific work of the Society; and it is a record of which the Society may well be proud. In many respects Essex is a county offering peculiarly favourable opportunities for local scientific research. It has a large seaboard, in common with Suffolk, it contains deposits of "Red Clay," the brick-earths of Ilford and elsewhere teem with remains of Pleistocene mammals, and prehistoric and other ancient works of man abound within its limits. Moreover, in Epping Forest it possesses a tract full of interest alike to the naturalist and the antiquarian. To the workers in all the branches of local scientific research the president does full justice.

IN the *Jahrbuch der k.-k. geol. Reichsanstalt*, Band li., Heft 1 (1901), Dr. O. Abel contributes a very interesting paper on some curiously marked pebbles from the Algerian Sahara. The pebbles, as the result of exposure to desert erosion, possess a characteristic surface sculpture of ridges and furrows, which have a more or less regular radial disposition. The special interest of this character lies in its wonderfully close resemblance to the sculpture frequently exhibited by moldavite, made more particularly familiar to us through Dr. F. E. Suess's advocacy of the meteoric origin of this mineral. The sculptured pebbles dealt with in this paper are of discoid form, and radial furrows are impressed on both sides of the disc. At the periphery the furrows become more plainly marked, and tend to pass across the margin of the disc in a direction at right angles to the flattened surfaces. The author examines the possible causes of this curious sculpture, and concludes that the ordinary action of the wind, driving sand-grains against the motionless pebbles, would be quite inadequate to produce the stellate figures on opposite surfaces of the stone. He believes, however, that the natural sand-blast is, in fact, the true eroding agent, but that the pebbles were rotating when attacked by it, while raised from the ground and driven forward over the surface of the desert during repeated sand-storms. That the stellate sculpture would result from such agencies the author considers to be proved by certain experiments carried out by Dr. F. E. Suess, to which he refers. As regards the analogous sculpture of moldavite, the author suggests that it might also have been produced by the prolonged exposure of the moldavite fragments to desert conditions, an idea which is supported by the form and size of the moldavite specimens, as well as by the relative softness of this glass when compared with quartz sand. At the same time, he considers that the theory of the cosmic origin of moldavite is in no way weakened by such a conclusion. The paper is excellently illustrated.

THE University of Texas Mineral Survey, under the direction of Mr. W. B. Phillips, has issued a report on sulphur, oil and quicksilver in Trans-Pecos (*Bulletin*, No. 2, 1902). In the Cretaceous area in Texas both heavy and illuminating oils are found at no great distance from each other. The subject was dealt with in *Bulletin* No. 1; some further particulars are now given, and complete analyses of all the coals, lignites and asphalt rocks, together with tests of the fuel value of the different oils, are in preparation. Quicksilver ores, chiefly cinnabar, occur in Brewster county in hard Cretaceous limestone and in decomposed shale, the rich stringers and pockets of cinnabar being found along bedding-planes and in cracks of the limestone associated with shaly matter. Intrusions of dolerite occur near by, and with them are probably connected the disturbance of the strata and the deposition, most likely from aqueous solution, of the metallic impregnations. Important sulphur deposits are met with in El Pasco county, and it is considered that 300,000 tons are available within forty feet of the surface in the vicinity of Maverick Springs. The area is described as consisting of a white plain of gypsum with a few small hills upon it, those on the west of gypsum, and those on the east of more recent conglomerate and white dolomite. The beds of gypsum overlie Upper Carboniferous sandstones and shales and are probably of Permian age. Throughout the tract sulphur springs are common, sulphur occurs in various forms, and the soil in places contains as much as 5 per cent. of free sulphuric acid. The gypsum beds are from 300 to 500 feet thick, and sulphur occurs in small crystals embedded in white gypsum, sometimes to the extent of 25 per cent. Elsewhere the sulphur occurs as a bluish ore in a siliceous earthy gangue, yielding 70 per cent. of sulphur. The matrix is locally bituminous, and it is noted that in all localities there are signs of oil. From a careful study of the subject, Mr. E. M. Skeats is of opinion that the richer bluish ores were formed from sulphur waters at a time when they were above ground, and probably through the agency of certain algæ which are plentiful in the sulphur springs to-day. All the sulphur occurs in and with gypsum and in connection with water containing sulphuretted hydrogen. The ores in which the sulphur occurs as crystals were probably formed by the decomposition of sulphuretted hydrogen given off from the highly charged water when it entered a porous or broken stratum. It is further considered that the gypsum may have been at one time carbonate of lime, for in many places it is difficult to say where limestone ends and gypsum begins.

WHILE we have large engineering workshops all over the country supplying machinery for practical use, it is with interest we note that a journal dealing with model making on a very

practical scale is published for the benefit of young engineers and amateurs. The *Model Engineer and Amateur Electrician* forms the medium for enthusiastic students fond of engineering, and we find in its columns practical working drawings and photographs contributed and explained in a very lucid manner. Under the heading of "Queries and Replies," readers in difficulty for information get their wants adequately supplied in a subsequent issue. A good example of this is found on p. 165 (April number), where a working general arrangement of a model locomotive is given for a two and a half-inch gauge railway and drawn to a scale of half inch to a foot, in the design of which we notice water tubes placed inside and across the firebox, an idea only introduced into actual locomotive practice a few months ago. Electricity and petrol motors also form an important part within the columns of the periodical, practical types of dynamos, motors, &c., being thoroughly dealt with. A paper of this description brings within the scope of students a practical application of science to mechanical engineering, enabling them to grasp the fundamental ideas of construction and also to carry them through into a practical working form.

IN the article by Sir Michael Foster, on the Regina Margherita Observatory, in last week's NATURE (p. 569), the height of the Gnifetti hut, given as 4560 feet, should be 4560 metres; the height in feet is 14,961.

SEVEN volumes belonging to the valuable "Scientia" series have been received from the publisher, M. C. Naud, of Paris. Six of the volumes (Nos. 13–18) are in the physical section of the series, and one (No. 12) is in the biological section. Each volume may be described as a short review of knowledge of the subject with which it deals, or a statement of observations and results interpreted in the light of recent scientific thought. The titles and authors of the volumes which have just come to hand are "Cryoscopie," by the late M. F. M. Raoult; "Franges d'interférence," by Prof. J. M. de Lépinay; "La Géométrie non-euclidienne," by M. P. Barbarin; "Le Phénomène de Kerr et les Phénomènes électro-optiques," by M. E. Néculcéa; "Théorie de la Lune," by Prof. H. Andoyer; "Géométrographie, ou Art des Constructions géométriques," by M. E. Lemoine; and "L'Hérédité acquise: ses conséquences horticoles, agricoles, et medicales," by M. M. J. Constantin.

THE additions to the Zoological Society's Gardens during the past week include a Campbell's Monkey (*Cercopithecus campbelli*), a Hocheur Monkey (*Cercopithecus nictitans*) from West Africa, presented by Captain Joseph C. Verey; a Sooty Mangabey (*Cercocebus fuliginosus*) from West Africa, a Black-headed Lemur (*Lemur brunneus*), a Red-fronted Lemur (*Lemur rufifrons*) from Madagascar, two King Penguins (*Aptenodytes pennanti*), a Thick-billed Penguin (*Eudyptes pachyrhynchus*) from the Macquarie Islands, two Common Rheas (*Rhea americana*) from the Argentine Republic, a Raven (*Corvus corax*) European, two Eupatorian Parrakeets (*Palaeornis eupatria*), three Indian Rat Snakes (*Zamenis mucosa*), five Tigrine Frogs (*Rana tigrina*) from India, deposited.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN MAY.

May 1. 1h. Jupiter in conjunction with moon. Jupiter 5° 59′ S.
1. 13h. 12m. to 14h. 7m. Moon occults c' Capricornii (mag. 5·2).
4. 5h. Venus in conjunction with moon. Venus 4° 19′ S.
7. Sun partially eclipsed, invisible at Greenwich.
14. 12h. 9m. Minimum of Algol (β Persei).
15. Venus. Illuminated portion of disc = 0·589, of Mars = 0·996.
17. 8h. 58m. Minimum of Algol (β Persei).
May 20. Saturn. Outer minor axis of outer ring = 14″·84.
20. 13h. 18m. Moon makes a near approach to α Libræ (mag. 3).
26. 20h. Saturn in conjunction with moon. Saturn 5° 18′ S.
28. 6h. Mercury at greatest elongation, 23° 3′ E.
28. 12h. Jupiter in conjunction with moon, Jupiter 5° 57′ S.
29. 4h. Mercury in conjunction with Neptune. Mercury 2° 52′ N.

COMET 1902 *a* (BROOKS).—The discovery of the first new comet of the present year was made by Mr. Brooks at Geneva on April 15, and the following data are supplied for the position at discovery and various subsequent epochs:—

1902.	h.	m.	Place.	R.A. °	′	″	N.P.D. °	′	″	Observer
April 15	16	0	Geneva	347	2	0	62	35	0	Brooks.
,, 16	14	37	Kœnigsberg	348	55	16	63	53	25	—
,, 16	15	8·1	Copenhagen	349	3	12	63	58	39	Pechüle.
,, 16	15	30·2	Bamberg	349	6	54	64	1	1	Hartwig.
,, 16	15	45·6	Lick	350	16	56	64	47	34	Aitken.

The original announcement of discovery described the comet as being bright, with a tail. A later description by Prof. Hartwig states that the comet is about 8·5 magnitude, circular in form with a diameter of 3′. There is a central condensation and a tail somewhat less than 30′ in length.

At discovery the new comet was quite close to β Pegasi; it is now moving to the south-east rather rapidly.

NEBULÆ AND THEIR VELOCITIES IN THE LINE OF SIGHT.—Dr. J. Hartmann, of the Potsdam Observatory, gives (*Sitzungsberichte der Kön. Preuss. Akad. der Wissenschaften zu Berlin*, February 27, 1902) an interesting account of his investigation to determine the velocities in the line of sight of several gaseous nebulæ, the spectra of which he has photographed. The work was suggested to him after he had secured a very strong image of the planetary nebula G.C. 4390 with the Potsdam photographic refractor of 80 cm. in the short time of exposure of 15 minutes. In the investigation two spectroscopes were employed, that which he designates apparatus I. consisting of a flint glass prism of 60°, a collimator of 530 mm. and a camera of 720 mm. focal lengths; while apparatus III. has three flint glass prisms of 63°, a collimator of 480 mm. and a camera of 410 mm. focal lengths. The exposures of the different negatives obtained varied from 90 to 270 minutes, and the comparison spectrum photographed in each case was that of the arc spectrum of iron; the nebulæ photographed and the spectra of which were examined for movement in the line of sight were G.C. 4390, 4373, and N.G.C. 7027. Dr. Hartmann determined first of all the velocity of the nebula G.C. 4390 from the measurements of the hydrogen lines Hβ and Hγ, and from this value deduced the wave-lengths of the two chief nebula lines. All the values for the velocity as determined from the different negatives agreed well among themselves, and the deduced mean values for the wave-lengths of the two nebula lines were 5007·04 and 4959·17. While the former value is practically identical with the wave-length obtained by Prof. Keeler for the Orion nebula 5007·05 ± 0·03, the latter is somewhat greater than Keeler's value, namely 4959·02 ± 0·04. Dr. Hartmann finds that the discrepancy is easily explained, as Keeler used a spark spectrum of iron for comparison, and the two lines of iron close together at this wave-length behave differently under the two electrical conditions (arc and spark). If it be assumed that Keeler's comparison line was that at wave-length 4957·78 instead of at 4957·63—and Dr. Hartmann seems to have good reasons for making this assumption—then his own result is brought in complete accord. The paper further gives details of each of the measurements on the different photographic negatives employed, but the following table shows only the mean results obtained, giving Keeler's values for comparison:—

Nebula	Velocity Hartmann km.	Keeler km.
G.C. 4390 ...	−10·5	−9·7
G.C. 4373 ...	−65·8	−64·7
N.G.C. 7027 ...	+4·9	+10·1

It is interesting to note that Dr. Hartmann finds slightly different values of the velocity for the middles in relation to the